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ABSTRACT

A study examined the nature, status, and trends in the delivery of technical content and instructional methods courses to prepare industrial arts teachers. The members of the Mississippi Valley Industrial Teacher Education Conference were used as a representative group for the preliminary survey. Data collected from the individuals indicated that most schools (86 percent) offer industrial teacher education programs within an academic unit that offers technology programs. Most schools do not offer special technical content courses designed exclusively for technology majors or for those preparing to teach. Approximately 90 percent of the schools offer one or more professional teaching or curriculum courses to those preparing to become industrial teachers. Of those schools, over 90 percent include experiences and activities in the technologies contained in the content of such methods courses. It was concluded that including those preparing to become industrial teachers in comprehensive technology programs that also prepare other types of professionals has several advantages. For example, this practice results in increased course and section offerings, affords students the opportunity to select in-depth specialized courses, enables future teachers to study with potentially better qualified faculty, and frequently results in enriched career development opportunities for them. (MN)

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Teacher Education in Technology Programs: Is It Working?

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Industrial teacher educators in the United States have been quite conscious of the growth of academic programs to prepare technologists for careers in industry. It is common knowledge that in some universities, industrial teacher educators have initiated such programs. These and other initiatives have resulted in a significant shift of graduates. An analysis of thirty programs in the 1980/81 and 1983/84 edition of the Industrial Teacher Education Directory (Dennis, 1980; 1983) shows that within academic departments, the graduates listed under industrial arts/industrial education decreased from 938 to 661 or 29.5 percent. Accompanying this is a dramatic increase in non-teacher industrial preparation graduates from 131 to 1381 or 1053.4 percent.

This is only one example of major changes in academic units in which teachers of industrial subjects are prepared. Those changes present challenges and opportunities to industrial teacher educators in the ways and means that technical and methods content pertinent to teachers in preparation is structured and presented. Members of the Mississippi Valley Industrial Teacher Education Conference were used as a representative group for a preliminary survey to determine the nature, status and trends in the delivery of technical content and instructional methods courses to prepare industrial arts teachers. The results of this preliminary survey show that:

1. Most schools (86%) offer industrial teacher education programs within an academic unit that offers technology programs.

2. All the schools which offer industrial arts teacher preparation programs and technology programs for industrial careers make the same knowledge, skills and understandings in technology courses available to students of either program.

3. Most schools (61.3%) do not offer special technical content courses to students who prepare to teach.

4. Eighty percent of the schools which offer special technical content courses for teacher preparation students include teaching methods or activities as part of those courses.

5. Most schools (74.2%) do not offer special technical content courses exclusively for technology majors.

6. Most schools (90.3%) offer one or more professional teaching/curriculum courses to industrial teachers in preparation.

7. Over ninety percent (90.3) of the schools which offer one or more professional methods (instruction/curriculum) courses include experiences and activities in the technologies in those courses.

The same technical or technology content is taught to industrial arts teacher preparation students and students who are preparing for industrial careers, and that "methods courses" attempt to intertwine methodology and technical experiences in most programs.

On the surface, this represents a virtual revolutionary change in the teacher preparation programs. What might be the character of this revolutionary change?

Not too many years ago, technology content was imparted to teachers in preparation in a structure which had them, as university students, do the same things as the students they would teach in junior and senior high schools.

While there seemed to be little justification in having sophisticated, intelligent university students make elementary, junior or senior high school projects to fulfill requirements of technical subjects, this was characteristic of the content and method delivery system some years ago. This situation prompted some to challenge industrial teacher educators with such questions as: Which activities experienced as students on the college level were in truth elementary, junior or senior high school activities? How much of the technology content that was mastered and how much of the manipulation in technology courses on the university level were identical to those things that were clearly expected of students on the elementary, junior high or high school level? Is it proper on the university level to use junior and senior high school level text books, to replicate junior and senior high school activities and to pass these activities off as appropriate university level content in industrial technology?" (Streichler, 1977, p. 3)

With the dominance of technology programs for careers in industry, it may be assumed that the technology content studied by industrial teachers in preparation is more akin to the level of content that a history or biology teacher in preparation may experience. That is to say, the latter groups study substantial university level content taught by practicing historians or biologists. It appears that students preparing to teach industrial subjects are beginning to receive their technology content from practicing technologists. If this is true, then it may be possible to respond to Lauda's (1983) admonition. What he calls out for teacher preparation appears to apply equally to the preparation of technologists for industry. He asserts that "students must move from unit lab/technical lab oriented courses to broad-based/technology lab oriented courses. Now content organizers need to be utilized with production (manufacturing, construction) communication and transportation (energy/power), (p. 11)."

There are several advantages to students preparing to teach industrial arts who study in comprehensive technology programs which also prepare other types of professionals. The individual preparing to teach should gain:

1. Broad based/technology lab oriented experiences.
2. Increased course or section offerings.
3. Learning experiences in technology content with faculty who are practicing technologists.
4. Opportunities to elect in-depth specialized courses within manufacturing, construction, etc.
5. Opportunities to study with potentially better qualified faculty.
6. Enriched career development opportunities.
7. Opportunities to study the "technology of teaching" with faculty who devote their full professional attention to methodology.

The trend toward what may be characterized as university level technology content precludes any sort of methodological instruction within such courses as was the case some years ago. This offers teacher educators an opportunity to develop a strong but different sequence of courses to impart skills and knowledge to prepare effective teachers of industrial subjects. Such a sequence would capitalize on the existence of substantive independent technical courses and would build the development of pedagogical skills

around experiences with the technology content as it would be presented in the public schools. It would become the responsibility of the faculty teaching these courses to insure -- as the faculty who teach methods to prospective public school mathematics, science and social studies teachers do -- that methods courses deal with the selection, ordering and delivery of appropriate content. The preliminary survey discussed earlier does suggest that this is being attempted in a number of schools. What has not received wide attention, however, is the role that professional preparation courses can play in the teaching of technology subject matter. The following describes the approach at Bowling Green State University's School of Technology.

Much work has been done in the development of schemes for content in an (industrial) technology teacher preparation program (Streichler, 1982; Lauda, 1982). To attempt to duplicate these efforts in this presentation would be akin to saying that conservation tillage won't save the topsoil. Our survey results indicate that most schools offer one or more professional methods courses and that, in those courses, experiences and activities are integrated with technology content. This type of integration appears to be the best way of preparing teachers to teach the technology subject matter providing that a systematic technological (process) approach is used in the selection and presentation of these activities and constant vigilance is used to insure that the technology content is appropriate for teacher education majors. The scheme for this inclusion of technology-related activities in teacher preparation professional courses is depicted in Figure 1.

Insert Figure 1 about here

Four courses focus upon industrial technology as base -- upon which pedagogical skills and knowledge are taught and developed. The first course IE 252, Elements of Instruction, is a matriculation requirement usually taken in the sophomore year. It represents the first industrial teaching preparation experience for students. In this course, students are required to present a 20 minute videotape presentation including an appropriate introduction on an industrial technology management topic. Presentation, therefore, relates to planning, organizing, directing or controlling inputs, processes and/or outputs in an industrial technology system area. Students are further required to present or demonstrate an industrial technology systems subject later in the course.

It should be stated that not every activity or assignment is directed toward industrial technology. For example, in this course students must also complete formal assignments on "The Definition, Goals and Purpose of Industrial Arts," "Critical Incidents in Education," "Writing Performance Objectives," "Learning in Industrial Education," and to engage in a "Field Experience."

In course IE 352, Instructional Scope and Sequence, students are required to develop a Self Instructional Module (SIM) for an Industrial Technology Systems unit as well as develop a course of study on an Industrial Technology Systems topic. In most cases these assignments dovetail on each other allowing the student to develop the SIM as one lesson or unit of the course of study.

Course 447, Teaching Technology Systems, represents the most creative use of technical content from Industrial Technology Systems in the teacher preparation program. In this course, students focus completely on Industrial Technology and direct all of their efforts to understanding the philosophy, rationale and implementation strategies involved in the

teaching of this area to K-12 students. In one activity students work in a small group simulation setting that attempts to mirror a school district curriculum committee. The charge to each of at least 4 (depending on class size) groups is to develop objectives, activities, materials/resources and evaluation strategies for one (different in each group) introductory course in an Industrial Technology System (Construction, Manufacturing, Communication, Energy/Power). The results of this activity are truly remarkable.

The individual activity part of this course requires students to develop complete implementation strategies for a course in an Industrial Technology System Courses for this activity are selected from the Technical Foundation of America, Industrial and Technology Education: A Guide for Curriculum Designers Implementors, and Teachers (1983). It is hoped that, beginning next year, the Ohio guide of courses in industrial technology presently being pilot tested under the sponsorship of the Ohio Industrial Arts Association and the Ohio State Department of Education will be used. The Technical Foundation of America material is outstanding but it does not deal with exactly the same industry and technology content identified in Ohio. The overall objective of this activity is to prepare the student to consider all of the consequences and logistics involved in adapting curriculum content and activities/materials and supplies for the implementation of an industrial technology course.

The final course that a student takes in this professional preparation series is IE 449, Organization and Administration of Industrial Education. This course is taken immediately following student teaching in the same semester. Students must identify a laboratory system area like manufacturing and direct all logistics, organizational and management efforts toward the implementation of a program in the schools. This type of activity is timely and appropriate because the pre-service teachers have worked in the "real world" for ten weeks, but they are not "tainted" by that "real world" where "woodshop" and "metalshop" continue to thrive. The overall objective of this course is to prepare the student to adapt or adopt a laboratory for the inclusion on an industrial technology program.

These four courses feed upon the technology content core while borrowing from other professional course work. It is hoped that all student work will reflect a professional standard that, in part, comes from the student's general education coursework.

Bowling Green has a comprehensive methods sequence. It highlights the need to "go the extra mile" to develop a logical process oriented system for these activities. Hopefully, the model provided here will be useful to educators in other institutions as they continue to develop their method sequences. Again, the data from the aforementioned preliminary survey demonstrate that industrial teacher preparation programs are attempting to include (industrial) technology type of activities as part of their teacher preparation coursework, primarily in only one or two courses.

In closing, you should be aware that the presenters have enlarged upon the preliminary survey. The content of methods courses offered by respondents with greater specificity in a follow-up.

An excellent response to a survey form based on the Performance Based Teacher Education Modules (Cotrell et. al., 1972) is being received. Analysis of these responses will provide a keener profile on the particular course units, pedagogical and curriculum competencies being developed, and the ways in which technology content is being integrated with pedagogical content.

(Art/Pub 4)

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(Art/Pub 4)

IE 252

ELEMENTS OF INSTRUCTION

Activity:

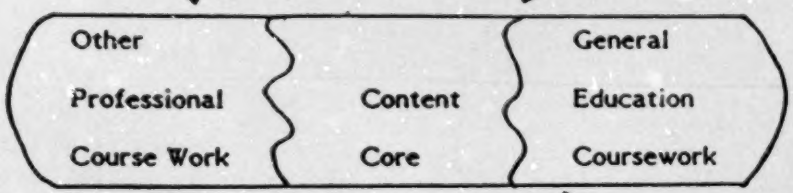
Videotape (microteaching) presentation on a topic in industrial technology management. Demonstration of an Industrial Technology related subject.

IE 352

INSTRUCTIONAL SCOPE AND SEQUENCE

Activity:

SIM on an Industrial Technology Systems unit. Course of study on an Industrial Technology System topic.



IE 447

TEACHING TECHNOLOGY SYSTEMS

Activity:

Development of a complete implementation strategy for a course in one technology system.

Group Activity:

Development of 4 Introductory Courses of Study in the 4 (Ohio) Industrial Technology Systems.

IE 449

ORGANIZATION AND ADMINISTRATION IN INDUSTRIAL EDUCATION

Activity:

Budget practices, shop organization, tool maintenance, material acquisition, record keeping, facility planning, safety and other industrial management practices related to the institution and implementation of one of the four (Ohio) Industrial Technology Systems

Figure 1
SCHEME FOR THE INCLUSION OF TECHNOLOGY RELATED ACTIVITIES INTO I.E. PROFESSIONAL COURSES

(Art/Pub 4)

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